

## Modeling Context Effects in the National Survey of Drug Use and Health (NSDUH)

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### 1. Introduction

A context effect may be said to occur when the response to a question is affected by information that is not part of the question itself. Context effects may occur due to the content of preceding questions, the cognitive process that a respondent goes through in answering preceding questions or other aspects of the questionnaire. In terms of questionnaire changes, context effects may be said to take place between two survey questions when a change introduced to the first (or contextual) item affects the response process for the subsequent (target) item, which in turn may lead to a different response than if the change had not been made.

Hair (2005) observes that much of the existing research on context effects examines the degree to which context effects occur across a general population. Comparatively little work has been done examining if different types of respondents might be more or less susceptible to changes in context. In this paper, we use data from the National Survey of Drug Use and Health (NSDUH) for 2002 and 2003 to determine if some types of respondents were more greatly affected by a contextual change than other respondents. The NSDUH is an annual in-person, cross-sectional study that is conducted in all 50 states and the District of Columbia. About 170,000 households are screened and interviews are conducted with about 67,500 persons in each year. The survey is administered primarily through an audio computer-assisted self-interview (ACASI) via a laptop computer. The NSDUH is designed to measure the prevalence and correlates of drug use in the United States population age 12 and older.

### 2. Background

Item SEN13B in the 2002 and 2003 NSDUH asks “How do you feel about **adults** trying marijuana or hashish once or twice?”

1. Neither approve nor disapprove
2. Somewhat disapprove

3. Strongly disapprove

DK/REF

In 2002 (and in 2001 and 2000), SEN13B was preceded by SEN13A, which reads:

How do you feel about **adults** smoking one or more packs of cigarettes per day?

1. Neither approve nor disapprove
2. Somewhat disapprove
3. Strongly disapprove

DK/REF

In 2003, item SEN13A was dropped. Item SEN13B remained and was immediately preceded by item SEN12C:

**During the past 12 months**, how many times have you attacked someone with the intent to seriously injure them?

1. 0 times
2. 1 or 2 times
3. 2 to 5 times
4. 3 to 9 times
5. 10 or more times

DK/REF

Item SEN13B is asked of all respondents over the age of 18 as part of a sequence of questions (beginning with item SEN13A) since the 1998 National Household Survey on Drug Abuse (NHSDA)<sup>1</sup>. As shown in Table 1, the percentage of those responding “neither approve nor disapprove” to SEN13B jumped to 50 percent in 2003, up from 35.4 percent in 2002 and comparable percentages in 2000 and 2001. Given the prior year-to-year response patterns to this question and the change in question placement, it seems likely that some of the change between 2002 and 2003 was due to the change in question placement. The 2004 survey repeats the 2003 questionnaire sequence with regard to item SEN13B.

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<sup>1</sup> The name of the survey changed to National Survey on Drug Use and Health (NSDUH) in 2002.

Our hypothesis is that the removal of item SEN13A in 2003 led to an increase in the percentage of “neither approve nor disapprove” to SEN13B, as compared to earlier years. Given the similar question structure for items SEN13A, SEN13B, SEN13C and SEN13D in the years prior to 2003, respondents may have interpreted these questions as part of a sequence and may have given answers to SEN13B relative to their answers to SEN13A. To some respondents, the sequence of items SEN13A-SEN13D may have implied an increasing order of stigma associated with the behaviors asked about. Having indicated a level of disapproval of smoking, some respondents may have felt compelled to indicate the same or higher levels of disapproval of marijuana use.

There are also slight differences between items SEN13A and SEN13B that are more prominent if SEN13B is considered in isolation. SEN13B asks about “trying” marijuana “once or twice” while SEN13A asks about “smoking one or more packs of cigarettes per day”. The notion of experimentation vs. regular use may have been more apparent to respondents in 2003 than in prior years.

### 3. Hypotheses

First, we expect that the responses to SEN13B of those who have recently used marijuana (and as such are more likely to be regular users of marijuana) will be relatively unaffected by the removal of item SEN13A. That is, for regular marijuana users, the removal of an item on disapproval of regular cigarette smoking should have very little effect on responses to an item on disapproval of marijuana, relative to those who are not regular users of marijuana.

Second, for respondents who are not currently using marijuana, we expect that the removal of an item on the level of disapproval of regularly smoking cigarettes will have an effect on responses to SEN13B due to the removal of a standard of comparison for respondents when answering SEN13B.<sup>2</sup> Context effects may arise due to a change

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<sup>2</sup> The concept of “anchoring” in the response formatting phase of answering questions is closely related to, but not identical with the notion of changes in the standard of comparison. “Anchoring” focuses on the idea that respondents must format their responses using a particular set of categories

in the contextual item that affects the judgment being rendered for the target item. For example, the evaluation of a particular politician may be greatly affected by the text of preceding questions about other politicians. For item SEN13B, we believe that this effect will manifest itself particularly among current cigarette users (who do not also currently use marijuana). Recent cigarette users might be especially likely to indicate disapproval of marijuana, especially after having been asked a similar item about their own behavior (regular smoking), all else being equal. Current cigarette users in particular should show lower levels of disapproval of marijuana in 2003 than in 2002.

In 2002, respondents would have drawn from their considerations on cigarettes (usage, risks) and marijuana (usage, risks) to answer SEN13B. In 2003, they would only have drawn from considerations of marijuana (usage, risks). Context should not have affected responses of persons who currently use marijuana as well as those with very strongly held views on the risks of marijuana (view it as very dangerous). Those with more internal consistency in their beliefs about risks of marijuana should be less affected by changes in context.

### 4. Logistic Regression Analyses of Marijuana Attitudes

We estimated logistic regression models in which the dependent variable was a dichotomous version of item SEN13B (1=neither approve nor disapprove, 0 otherwise). The ordinal nature of item SEN13B suggests that we use ordered logistic regression to model responses to this item. But while the response categories for SEN13B are ordinal, the nature of the change in the frequencies for this item is concentrated in responses of “neither approve nor disapprove” and there is almost no difference in the percentage changes for the other two response categories. In the unweighted frequencies, the percentage responding with “somewhat disapprove” decreases from 18.5 to 13.9 percent, about a 25 percent decrease. The percentage responding with

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and that this can affect responses to subsequent items. Tourangeau, Rips and Rasinski (2000: 214) note that while it is possible in theory to distinguish between context effects due to judgmental contrasts vs. anchoring or responses, “In practice,...it can be difficult to determine whether the prior question is serving as an extreme standard of comparison or a scale anchor or both.”

“strongly disapprove” decreases from 45.9 to 35.6 percent, a similar 22 percent decrease. Had we seen different percentage changes for the “somewhat disapprove” and “strongly disapprove” categories, estimation of an ordered logit model would have been more appropriate for detecting differences in how respondents answered this item between 2002 and 2003.

We created nine indicator variables for respondents defined by the crossclassification of three levels of cigarette and marijuana usage from the survey. We refer to “current users” of marijuana/cigarettes as those who reported using marijuana/cigarettes in the past 30 days and “previous users” as those whose last use of marijuana/cigarettes was more than 30 days ago. The final level of marijuana/cigarette usage is for respondents who report never having used marijuana/cigarettes.

The distribution of respondents by these classifications of cigarette and marijuana usage showed very little change between 2002 and 2003. Compositional changes alone in terms of the distribution of respondent experiences with cigarette and marijuana usage cannot account for the magnitude of the change in responses to SEN13B.

Lacking an item on perceived risk of trying marijuana once or twice, we included in the model responses to item RK01b, which measures the perceived risk of occasional marijuana use. We expected that those who perceive a greater risk from using marijuana occasionally would be more likely to express disapproval of trying marijuana. To assist in evaluating the impact of excluding item SEN13A in 2003, we also included the item on the perceived risk of smoking cigarettes.

In addition to demographic items such as marital status, whether or not children were in the household, race/ethnicity and education, we added three items also thought to be correlated with attitudes towards marijuana. We felt that those who had ever been arrested would be more likely to have favorable attitudes towards marijuana use. The item on frequency of attending religious services was included since we thought that those with more frequent visits would have more “conservative” social values and thus less favorable attitudes towards trying marijuana. We also included a summated index of the three religious attitude items in the survey (with higher scores indicating greater importance of religion in one’s life).

Finally, we included responses to item SEN13A, on the level of approval or disapproval of cigarette smoking, the key contextual item that was removed in the 2003 survey as a final predictor of responses to item SEN13B in 2002.

## 5. Results

Table 2 presents the results of separate logistic regression analyses of responses to item SEN13B in 2002 and 2003.<sup>3</sup> The differences in regression coefficients between the 200 and 2003 estimates are shown in the far right column along with the standard error of the difference.<sup>4</sup> Among the groups defined by cigarette and marijuana usage, those who currently use cigarettes (and are not also current users of marijuana) were more likely to respond to item SEN13B with “neither approve nor disapprove” than those who currently smoke cigarettes and use marijuana. The only other group to show a significant change between 2002 and 2003 were those who have previously smoked cigarettes and have never used marijuana.

Differences in the regression coefficients for the nine groups defined by cigarette and marijuana usage are plotted in Figure 1. We see that the responses to SEN13B of current cigarette smokers who are not also recent users of marijuana were more affected by the exclusion of item SEN13A from the 2003 survey

<sup>3</sup> Complete results, including weighted analyses, can be found in Wang, Flicker, Baxter, McNeeley and Snodgrass (2005).

<sup>4</sup> Standard errors for differences in regression coefficients were calculated by assuming independence between the two years of the survey. Since the NSDUH sample design contains a 50 percent overlap of sample segments between successive years of the survey, this implies that these standard errors are overstated. To test the sensitivity of the results to this assumption, we estimated models which specified the survey design but assigned all cases a weight of one. Standard errors for differences between regression coefficients were calculated by adjusting the standard error of the difference assuming independence by the ratio of the variances between a pooled model (which excluded SEN13A as a regressor in 2002) and standard errors assuming independence (which also excludes SEN13A as a regressor). Only slight differences emerged in these standard errors from the ones shown in Table 2.

than those who have never used cigarettes or those who have previously used cigarettes. We also see that the exclusion of SEN13A had a much smaller impact on the responses of those who currently use marijuana than those who have never used marijuana or have used marijuana but not recently.

Similar patterns are observed when we examine changes in the predictive margins for each group, shown in Figure 2. The predictive margin for each of cigarette and marijuana usage group gives the predicted probability of the dependent variable assuming that all sample members are in that group (Graubard and Korn, 1999). As in Figure 1, the removal of item SEN13A appears to have had the greatest impact on the responses of current cigarette users (who are not also current marijuana users).

## 6. Logistic Regression Analysis of Using Marijuana

We also estimated models of having used marijuana in the last 30 days, using responses to SEN13B as a predictor to determine if responses to SEN13B were more valid in one year as opposed to the other. This was carried out in a model in which data for the two years was pooled. A dummy variable indicating the 2003 survey was created and interaction terms were created for each predictor variable with the dummy variable for the 2003 survey year. As expected, we found that responses of “somewhat disapprove” or “strongly disapprove” are negatively associated with usage of marijuana in the last 30 days. This effect however, is smaller in magnitude in 2003 than in 2002. The coefficients for the interaction terms between survey year and responses of “somewhat disapprove” and “strongly disapprove” are positive and statistically significant, suggesting that the null hypothesis of no difference between the effects of responses to SEN13B can be rejected. Thus, responses in 2002 may be more valid indicators of the true underlying beliefs about marijuana than responses in 2003.

## 7. Conclusion

We have found that the removal of item SEN13A in the 2003 NSDUH had an effect on responses to item SEN13B in 2003 as compared to previous years. What remains unclear is the nature of the means by which the removal of SEN13A affected responses to SEN13B. The estimated models identify current cigarette users (who are not also current marijuana users) as respondents who were especially likely to

respond to item SEN13B with responses of “neither approve nor disapprove” in 2003 than in 2002. The models also correctly identified respondents who previously used cigarettes and have never used marijuana as more likely to respond to SEN13B with “neither approve nor disapprove” in 2003 than in 2002.

However, the estimated regression models did not identify two groups of respondents that showed a substantial change in their responses to item SEN13B between 2002 and 2003. A decomposition of differences in responses to item SEN13B between the 2002 and 2003 surveys shows that respondents who have never used either marijuana or cigarettes and those who previously used both account for about one third (5.5 percentage points) of the 15 percentage point increase in the proportion of respondents who responded with “neither approve nor disapprove” to SEN13B between 2002 and 2003. For respondents in these groups, a closer look at how the perceived risk of cigarette and marijuana questions affected responses to SEN13B (through SEN13A) might help in clarifying how the removal of item SEN13A affected responses to SEN13B.

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**Table 1: Percentage Distribution of Responses to SEN13B, 2000-2004 NHSDA/NSDUH**  
 “How do you feel about adults trying marijuana or hashish once or twice?”

<b>Unweighted</b>	2000	2001	2002	2003	2004
Neither approve nor disapprove	35.8	33.8	35.6	50.5	49.9
Somewhat disapprove	15.2	18.0	18.5	13.9	13.7
Strongly disapprove	49.0	48.2	45.9	35.6	36.4
<b>Weighted</b>	2000	2001	2002	2003	2004
Neither approve nor disapprove	30.5	27.9	28.2	43.1	42.3
Somewhat disapprove	13.8	16.4	17.1	13.7	13.5
Strongly disapprove	55.7	55.7	54.7	43.3	44.2

**Table 2: Logistic Regression Results for Selected Variables, Predicting Response of “Neither Approve Nor Disapprove” to Item SEN13B, 2002 and 2003 NSDUH**

Variable	2002		2003		2003 - 2002 (difference)	
	Coef.	SE	Coef.	SE	Coef.	SE
Cigarette, Marijuana Usage						
Current Cigarette, Current Marijuana	0.000	0.000	0.000	0.000	0.000	0.000
Current Cigarette, Previous Marijuana	<i>-1.359</i>	0.060	<i>-0.715</i>	0.067	<i>0.644</i>	0.105
Current Cigarette, Never Marijuana	<i>-2.212</i>	0.071	<i>-1.622</i>	0.072	<i>0.590</i>	0.119
Previous Cigarette, Current Marijuana	<i>0.294</i>	0.101	0.151	0.127	-0.143	0.187
Previous Cigarette, Previous Marijuana	<i>-1.179</i>	0.062	<i>-1.060</i>	0.067	0.119	0.106
Previous Cigarette, Never Marijuana	<i>-2.361</i>	0.069	<i>-2.121</i>	0.069	<i>0.240</i>	0.115
Never Cigarette, Current Marijuana	-0.153	0.166	-0.134	0.202	0.019	0.302
Never Cigarette, Previous Marijuana	<i>-1.122</i>	0.083	<i>-1.153</i>	0.084	-0.031	0.140
Never Cigarette, Never Marijuana	<i>-2.313</i>	0.067	<i>-2.246</i>	0.068	0.067	0.112
Perceived Risk of Occasional Marijuana Use						
No risk	0.000	0.000	0.000	0.000	0.000	0.000
Slight risk	<i>-1.006</i>	0.042	<i>-0.786</i>	0.050	<i>0.220</i>	0.075
Moderate risk	<i>-1.883</i>	0.045	<i>-1.545</i>	0.051	<i>0.338</i>	0.079
Great risk	<i>-2.516</i>	0.050	<i>-2.067</i>	0.052	<i>0.449</i>	0.084
Approval of adults smoking (item SEN13A)						
Neither approve nor disapprove	0.000	0.000				
Somewhat disapprove	<i>-1.578</i>	0.037				
Strongly disapprove	<i>-1.912</i>	0.037				
Constant	<i>3.428</i>	0.126	<i>3.143</i>	0.122	-0.285	0.207
Pseudo - R <sup>2</sup> (McFadden)	.3606		.2621			
Observations	42,947		43,534			

Coefficient estimates in italics are statistically significant at .05 level (two-tailed test)

Figure 1: Differences in Regression Coefficients for Cigarette Marijuana Usage Groups, 2003 - 2002

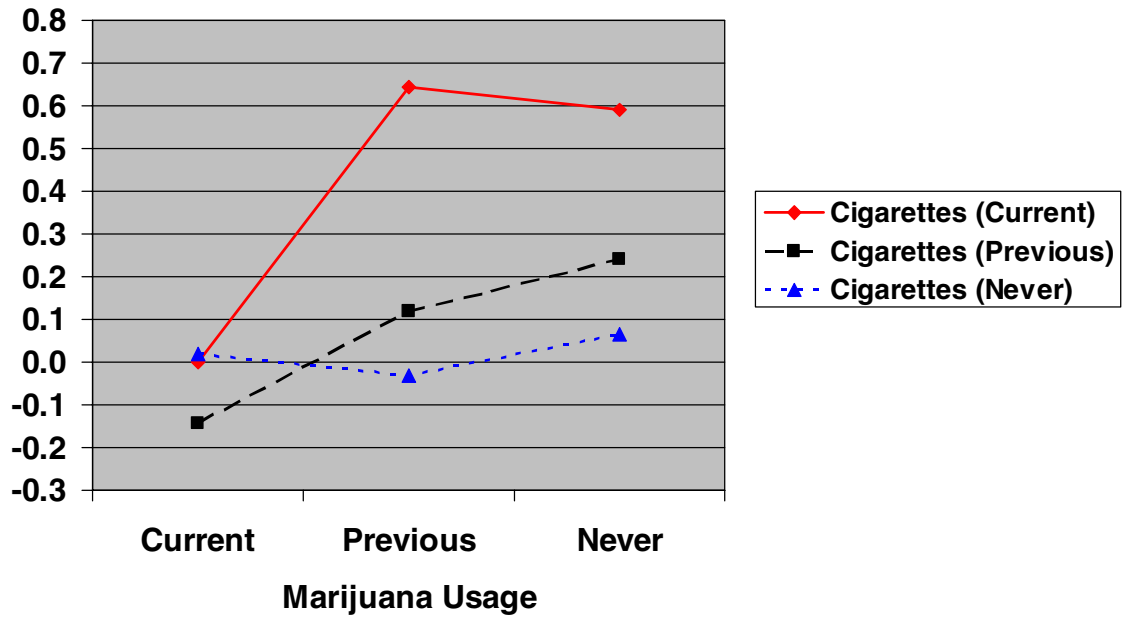


Figure 2: Differences in Predictive Margins for Cigarette, Marijuana Usage Groups, 2003 - 2002

